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File No. 3357-77US KPM:ER

Montreal, Canada
January 16, 1992

IN THE UNITED STATES PATENT AND TRADEMARKS OFFICE

In re Application of

Xuan Truong NGUYEN

For: RECYCLING WASTE CELLULOSIC
MATERIAL

S.N.: 663,397

Filed: March 1, 1991

Art Unit: 1303

Examiner: K. Hastings

The Commissioner of Patents
and Trademarks
Washington, D.C. 20231
U. S. A.

Sir:

In reply to the Official Action of October 22, 1991,
please amend the Application as follows.

IN THE CLAIMS

Please rewrite claim 22 as follows -

22. (Amended) A process for recycling waste cellulosic paper
product to produce a cellulosic fiber pulp comprising:

1) digesting a waste manufactured paper product having
a kappa number of at least 80 in an aqueous alkaline cooking
liquor containing at least one of sodium sulphide and
anthraquinone at [an elevated] a temperature of 160°C to 180°C
to effect a delignification of cellulosic fibers in said waste
product and produce a brownstock of a cellulosic fiber pulp
and spent liquor, said cellulosic fiber pulp having a kappa
number [lower than that of said paper product] up to 40, a
viscosity of at least 11 cps, and comprising fibers of a

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quality such that the pulp can be employed as the sole pulp in paper product manufacture.

Please cancel claims ~~23~~, ~~25~~ and ~~27~~.

Please rewrite claim 28 as follows -

~~3~~ 28. (Amended) A process of claim ~~22~~, wherein said waste paper product comprises a single waste paper product having [a] said kappa number of at least 80.

Please rewrite claim 29 as follows -

~~4~~ 29. (Amended) A process of claim ~~22~~, wherein said waste paper product comprises a mixture of waste paper products[, at least one of which has a kappa number of at least 80].

Please cancel claims 35 and 36.

Please rewrite claim 37 as follows -

~~12~~ 37. (Amended) A process of claim [35] ~~12~~, wherein said aqueous ^{alkaline} cooking liquor comprises a kraft white liquor.

Please rewrite claim 38 as follows -

~~10~~ 38. (Amended) A process of claim [36] ~~8~~, wherein said aqueous ^{alkaline} cooking liquor comprises a kraft white liquor.

Please cancel claims 1 to ~~21~~ and 41 to ~~47~~.

REMARKS

Claims 22, 24, 26, 28 to 34 and 37 to 40 are in the case.

In response to the election requirement made Final, claims 1 to 21 and 41 to 47 are cancelled without prejudice to Applicant's right to pursue such claims in continuation or divisional Applications.

Claims 22, 26 and 30 stand rejected under 35 U.S.C. 102(b) as being anticipated by Netherlands 7408641 or Japan 167475.

Claim 22 has been amended and now particularly recites the following additional limitations:

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- i) The starting waste manufactured paper product has a kappa number of at least 80.
- ii) The aqueous cooking liquor is an alkaline liquor containing at least one of sodium sulphide and anthraquinone. (See Examples 1 and 3.)
- iii) The digesting is at a temperature of 160°C to 180°C. (See page 12.)
- iv) The product cellulose pulp has a kappa number up to 40. (See page 7.)
- v) The cellulosic fiber pulp product has a viscosity of at least 11 cps. (See Examples, especially Example 9.)
- vi) The product fiber pulp comprises fibers of a quality such that the pulp can be employed as the sole pulp in paper product manufacture.

With this amendment of claim 22, claims 22, 26 and 30 are believed to fully distinguish over Netherlands 7408641 and Japan 16475.

Considering Netherland 7408641 this discloses two distinct processes. One involves cooking with sodium or ammonium sulphite in the presence of sodium carbonate, i.e., an acidic cooking liquor. The other involves the use of sodium hydroxide at 80 to 120°C.

The amendment in claim 22 to qualify the cooking liquor as alkaline excludes the sulphite embodiment of the Netherlands Patent. The recitation of the temperature of 160°C to 180°C for the alkaline cooking liquor in claim 22 excludes the sodium hydroxide treatment (carried out at 80 to 120°C) of the Netherlands Patent.

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The Example in the English language abstract of the Netherlands Patent shows a waste paper having a lignin content of 6.4% which is equivalent to a kappa of about 44. This is significantly lower than the kappa number of the starting material as defined by claim 22 which is at least 80 and is generally in the range 80 to 120.

The lignin content of waste paper product having a kappa of 80 to 120 in accordance with the present invention, would be in the 12 to 18% range. The delignification of these higher lignin content, higher kappa wastes would be expected to be more difficult than that of the papers described in the Netherlands Patent, and additionally it would be expected that removal of the lignin would result in a significant loss in strength.

There is here submitted a Declaration of the Inventor describing the use of the sulphite process (i.e., the acidic cooking liquor) of the Netherlands Patent to digest waste manufactured paper product having a kappa of 86 and an original viscosity of 26 cps. The digesting was carried out at 166°C, a temperature within that of the Netherland Patent and the present invention, for 3 to 4 hours. The pulps obtained had kappa numbers of 69 and 62 respectively with viscosities of 7.9 cps and 5.4 cps respectively. Based on these figures it can reasonably be predicted that more severe sulphite digestion in accordance with the Netherlands Patent, to obtain lower kappa pulps such as those required in the present invention, would result in pulps having still lower viscosities.

As explained commencing at page 6 of the submission of June 18, 1991, the viscosity of a pulp is a measure of the strength of the fibers and generally it is accepted that if

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the pulp has a viscosity of 10 or more, satisfactory paper products can be produced from the fibers as the sole fiber component.

The kappa numbers of 69 and 62 referred to in the Declaration of the Inventor employing the acidic cooking liquor of the Netherlands Patent are higher than those sought by the present invention and the viscosities are significantly below that set forth in claim 22 as amended, and significantly below the minimum value of 10 required for pulps which are to provide the sole fiber component of a paper product.

Considering the second embodiment in the Netherlands Patent which employs a sodium hydroxide cooking liquor, an examination of the Examples reveals that the products obtained are markedly inferior to those required by the present invention and more particularly claimed in claim 22 as amended.

Furthermore, as indicated above the temperature range for the cooking set forth in claim 22 as amended is significantly higher than that set forth in the Netherlands Patent in the case of an alkaline cooking liquor.

As indicated in the submission of June 18, 1991, the general wisdom prior to the present invention is that repulping or reslushing fibers even under relatively mild conditions results in fibers of inferior quality as compared with virgin pulp fibers, such that such repulped or reslushed fibers can not be employed as the sole fibers in paper manufacture.

It has been generally accepted that the inferior quality of such repulped or reslushed fibers as compared with comparable virgin pulp fibers, arises from the processing to

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which the fibers were subjected during the original paper product manufacture, and also from aging of the paper product.

Thus it was unexpected and surprising that the cooking procedure of the present invention, which employs relatively harsh conditions specifically a temperature of 160 to 180°C, would produce cellulosic fibers having a strength quality such that they could be employed as the sole fibers in the manufacture of paper products, and at the same time these fibers could be produced from waste paper products having a high kappa, more particularly in excess of 80, and there could be produced pulps having a relatively low kappa.

Examination of the Examples of the Netherlands Patent which employ the sodium hydroxide alkaline cooking liquor reveals physical parameters of tensile breaking strength, tear factor and burst factor which are markedly inferior to those achieved by the present invention. The accompanying Declaration of the Inventor identifies the physical parameters of papers produced from the pulps of Examples 6, 7 and 12 of the present Application and this demonstrates markedly superior tensile breaking strength length, tear factor and burst factor as compared with those in the Examples of the Netherlands Patent.

Examples III, VI, VII, VIII and IX of the Netherlands Patent employ alkaline cooking and provide values of tensile breaking length, burst factor and tear factor for papers produced from the resulting pulps. The values are tabulated in the Declaration of the Inventor. The highest values for the tensile breaking length, burst factor and tear factor are obtained in Example VIII of the Netherlands Patent, being 3.8 km, 25.3 and 76.3 respectively.

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In contrast, the papers produced from Examples 6, 7 and 12 of the present invention had significantly higher values for these three parameters.

It can be seen, therefore, that the process conditions employed in the present invention as defined by amended claim 22 are different from those of the Netherlands Patent, and superior results are obtained.

In the present invention the strength parameter was characterized by the viscosity of the pulp, in the original Examples. The Netherlands Patent does not identify the viscosities of the pulp but instead characterizes the paper produced from the pulp by reference to the tensile breaking length, burst factor and tear factor. Values achieved by the present invention for the pulps of Example 6, 7 and 12 are set forth in the Declaration of the Inventor to provide a ready comparison showing the superiority of the process of the invention over that of the Netherlands Patent.

Considering the Japanese Patent, this employs temperature conditions for the digestion which are below those required by the present invention. It is indicated in the English language abstract of the Japanese Patent that the product obtained is "blended into pulp for printing paper manufacture".

The upper right hand Table at page 4 of the Japanese Patent shows viscosity values of 6.4 and 6.2 cps.

Thus the present invention employs harsher temperatures than those described in the Japanese Patent but at the same time produces a pulp of high viscosity, generally greater than 11 and thus higher than the viscosities shown in the Japanese Patent, the viscosities of 11 or higher being above the minimum of 10 cp required to produce satisfactory

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paper products with the fibers as the sole fiber component. The Japanese Patent does not suggest employing the fibers as the sole component but only indicates blending them into other pulp. The indication of viscosity values of 6.4 and 6.2 cp is indicative that the pulps obtained did not have the minimum 10 cp viscosity to make them suitable for manufacture of paper as the sole fiber component.

The Japanese Patent also identifies breaking lengths for papers produced from the pulp inferior to those of the present invention, as discussed in the accompanying Declaration of the Inventor. Additionally the results in the Japanese Patent show that the pulp products were heavily contaminated, as discussed in the accompanying Declaration.

As indicated above, and in the submission of June 18, 1991, the conventional wisdom has been that reslushing or repulping fibers from waste paper products produces only inferior quality pulp which can not be employed as the sole fibers in paper manufacture. Generally, the reslushing or repulping has been carried out under mild conditions in an attempt to minimize deterioration in the fiber. Considering the teachings of the Japanese Patent, persons in the art would have expected that using higher temperatures than those taught in the Japanese Patent would result in still more inferior pulp products. Surprisingly, following the procedures of the present invention including higher temperatures than those taught in the Japanese Patent there are produced pulps of superior quality and more especially pulps which have a viscosity of at least 11 and which can be employed as the sole fiber component in paper manufacture.

This discovery which runs counter to conventional wisdom has considerable economic advantages, particularly in

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that it enables waste paper products to be recycled to produce high quality pulp which can be employed as the sole fiber component for paper manufacture. Additionally, the process of the invention employs cooking liquor in amounts relative to the waste paper product of about 55 to 65% of the requirement for producing an equivalent amount of virgin pulp from wood chips which is a further significant economic advantage; finally, older processing equipment which can not meet the current standards for digesting wood chips to produce virgin fibers can be employed for carrying out the process of the invention with its lower cooking liquor requirement.

In that claim 22 is believed to distinguish over the Netherlands Patent and the Japanese Patent, it is believed that claims 26 and 30 likewise distinguish.

Claims 22, 24, 26 and 30 stand rejected under 35 U.S.C. 102(b) as clearly anticipated by Murphy, U.S. Patent 3,440,134.

Murphy teaches a method involving use of sodium hydroxide and cooking at 160°C for about three hours. This process is well-known in the wood chip pulping art as the soda pulping process. It is indicated by Murphy that a high yield of 85 to 90% is obtained and that the resulting pulp has a potassium permanganate number of the order of 14/25 ml. This latter figure is equivalent to a kappa number of about 21. In order for a yield of 85 to 90% to be obtained, and produce a pulp with a kappa number of 21, the original kappa of the waste employed by Murphy would have to be in the 40 to 60 range and thus significantly less than the minimum required by claim 22 in the present invention.

If the waste employed by Murphy had a kappa in excess of 80 as required by the present invention, then to

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obtain a kappa number of 21 the yield would be much less than 80%.

It is thus evident that if Murphy achieved the yields indicated the kappa number of the starting material must be significantly below the minimum set forth in claim 22.

Since Murphy has relatively high yields it is evident that only a small amount of lignin is being removed (hence the high yield, if more lignin were being removed then the yield would necessarily be lower).

The teachings of Murphy only reinforce what has been discussed above and in the submission of June 18, 1991.

The conventional wisdom has been that significant decreases in kappa number can not be achieved without a corresponding deterioration in the fiber pulp product produced.

Murphy employed relatively harsh conditions but satisfied himself with a relatively small drop in kappa number.

The Netherlands Patent employed milder alkaline conditions but nevertheless produced a product markedly inferior to the pulp product achieved by the present invention.

The Japanese Patent also employed somewhat milder conditions and it appears with lower kappa number changes (the disclosure is from at least 50 to at least 40 kappa number), nevertheless produced pulps of low viscosity and more especially a viscosity below the minimum required by the present invention and the minimum generally accepted as being necessary for use of the pulp as the sole fiber component in paper manufacture.

Claims 22 to 25, 27 to 29 and 31 to 40 stand
rejected under 35 U.S.C. 103 in view of the Japanese Patent.

Although the Japanese Patent teaches a kappa number of at least 50, it is respectfully submitted that this does not render a kappa number of at least 80 obvious. As indicated above, the present invention represents a departure from the conventional wisdom with respect to reusing or recycling waste paper. The conventional wisdom was that use of high kappa wastes and their reduction to low kappa wastes would result in a pulp of inferior quality which could only be used when admixed with virgin pulp.

The temperature range claimed in claim 22 as amended does not overlap the upper limit of 150° taught by the Japanese Patent and is still further removed from the preferred range taught by the Japanese Patent.

With respect to the other process conditions it was certainly not obvious that by employing such conditions one could achieve recycling of waste paper products having high kappa in excess of 80 to produce a pulp with a significantly

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lower kappa but with fibers of superior quality such that the pulp can be used as a sole fiber component of paper. Not only was it not obvious but it was contrary to the conventional wisdom as explained above and in the submission of June 18, 1991.

Claims 24 and 25 stand rejected under 35 U.S.C. 103 as being unpatentable over the Japanese Patent and further in view of Murphy. Claim 25 has been cancelled. It is believed that claim 24 patentably distinguishes over the combination for the reason that claim 22, from which it depends, distinguishes over the references for the reasons indicated above.

Having regard to the foregoing comments, favourable consideration of the claims now presented is requested.

Respectfully,

Xuan Truong Nguyen

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Date: January 17, 1992

Enc.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231

on January 17, 1992
(Date of Deposit)

Antoinette Sullo
Signature and Title of Attorney
Antoinette Sullo
Signature
1-17-92
Date of Signature



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **XUAN TRUONG NGUYEN**

Docket No.: **91-169**

Serial No.: **663,397**

Group No: **1303**

Filed: **March 1, 1991**

Examiner: **K. Hastings**

For: **RECYCLING WASTE CELLULOSTIC MATERIAL**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

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AMENDMENT TRANSMITTAL

1. Transmitted herewith is an amendment for this application.

STATUS

2. Applicant is

☐ a small entity — verified statement:

☐ attached.

☐ already filed.

☒ other than a small entity.

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CERTIFICATE OF MAILING (37 CFR 1.8a)

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United State Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Antoinette Sullo

(Type or print name of person mailing paper)

Date: January 17, 1992

Antoinette Sullo
(Signature of person mailing paper)

(Amendment Transmittal [9-19]—page 1 of 4)

EXTENSION OF TERM

NOTE: "Extension of Time in Patent Cases (Supplement Amendments) — If a timely and complete response has been filed after a Non-Final Office Action, an extension of time is not required to permit filing and/or entry of an additional amendment after expiration of the shortened statutory period

If a timely response has been filed after a Final Office Action, an extension of time is required to permit filing and/or entry of a Notice of Appeal or filing and/or entry of an additional amendment after expiration of the shortened statutory period unless the timely-filed response placed the application in condition for allowance. Of course, if a Notice of Appeal has been filed within the shortened statutory period, the period has ceased to run." Notice of December 10, 1985 (1061 O.G. 34-35).

NOTE: See 37 CFR 1.645 for extensions of time in interference proceedings and 37 CFR 1.550(c) for extensions of time in reexamination proceedings.

3. The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply

(complete (a) or (b) as applicable)

(a) ☐ Applicant petitions for an extension of time for the total number of months checked below:

Extension (months)	Fee for other than small entity	Fee for small entity
<input type="checkbox"/> one month	\$ 110.00	\$ 55.00
<input type="checkbox"/> two months	\$ 350.00	\$175.00
<input type="checkbox"/> three months	\$ 810.00	\$405.00
<input type="checkbox"/> four months	\$1280.00	\$640.00
		Fee \$ _____

If an additional extension of time is required please consider this a petition therefor.

(check and complete the next item, if applicable)

☐ An extension for _____ months has already been secured and the fee paid therefor of \$ _____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request \$ _____

OR

(b) ☒ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

FEE FOR CLAIMS

4. The fee for claims has been calculated as shown below:

(Col. 1)		(Col. 2)	(Col. 3)	SMALL ENTITY		OTHER THAN A SMALL ENTITY	
CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADDIT. FEE	OR	ADDIT. FEE
TOTAL * 14	MINUS ** 47	=	--	x 10 = \$		x 20 = \$	--
INDEP. * 1	MINUS *** 4	=	--	x 36 = \$		x 72 = \$	--
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				+110 = \$		+220 = \$	--
				TOTAL \$		OR TOTAL \$	--
				ADDIT. FEE \$			

* If the entry in Col. 1 is less than entry in Col. 2, write "0" in Col. 3.

** If the "Highest No. Previously Paid for" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest No. Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest No. Previously Paid For" (Total or indep.) is the highest number found in the appropriate box in Col. 1 of a prior amendment or the number of claims originally filed.

(complete (c) or (d) as applicable)

- (c)
- ☒
- No additional fee for claims is required

OR

- (d)
- ☐
- Total additional fee for claims required \$ _____

FEE PAYMENT

- 5.
- ☐
- Attached is a check in the sum of \$ _____.

- ☐
- Charge Account No. _____ the sum of \$ _____.

A duplicate of this transmittal is attached.

FEE DEFICIENCY

NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum, six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1985, 1065 O.G. 31-33.

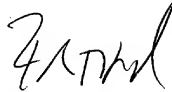
- 6.
- ☒
- If any additional extension and/or fee is required charge Account No. _____

AND/OR

☒ If any additional fee for claims is required, charge Account No.
02-0184

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